

**LISTING OF CLAIMS**

1. (currently amended) A method for low-density parity-check (LDPC) encoding of data, the method comprising:
  - defining a first MxN parity check matrix,  $H = [H1][H2]$ ;
  - generating, based on the first parity check matrix, a second parity check matrix having an MxM triangular sub-matrix by replacing [H1] with a triangular matrix; and,
  - mapping the data into an LDPC code word based on the second parity check matrix.
2. (original) A method as claimed in claim 1, further comprising eliminating 4-cycles from the second matrix.
3. (canceled)
4. (currently amended) A method as claimed in claim 15 +, comprising setting entries along the main diagonal of the MxM triangular sub-matrix to the same value.
5. (currently amended) Apparatus for low-density parity-check (LDPC) encoding of data, the apparatus comprising:
  - matrix definition logic for defining a first MxN parity check,  $H = [H1][H2]$ ;
  - a triangular matrix generator for generating a second parity check matrix based on the first parity check matrix

Serial No. 09/902,859  
Art Unit No. 2133

the second parity check matrix having an MxM triangular sub-matrix by replacing [H1] with a triangular matrix; and,

an encoder for mapping the data into an LDPC code word based on the second parity check matrix.

6. (original) Apparatus as claimed in claim 5, wherein the triangular matrix generator, in use, eliminates 4-cycles from the second matrix.

7. (canceled)

8. (currently amended) Apparatus as claimed in claim 16 5, wherein the matrix definition logic, in use sets entries along the main diagonal of the MxM sub-matrix to the same value.

9. (currently amended) A computer program product for low-density parity-check (LDPC) encoding of data, the computer program product comprising a machine readable storage medium storing computer program code which, when loaded in a programmable data processor, configures the processor to perform the steps of:

defining a first MxN parity check matrix,  $H = [H1][H2]$ ;  
generating, based on the first parity check matrix, a second parity check matrix having an MxM triangular sub-matrix by replacing [H1] with a triangular matrix; and,  
mapping the data into an LDPC code word based on the second parity check matrix.

**Serial No. 09/902,859**  
**Art Unit No. 2133**

10. (original) A computer program product as claimed in claim 9, further comprising eliminating 4-cycles from the second matrix.

11. (canceled)

12. (currently amended) A computer program product as claimed in claim 17 9, comprising setting entries along the main diagonal of the MxM triangular sub-matrix to the same value.

13. (currently amended) A data transmitter for transmitting data received from an information source via a communications channel, the data being encoded by the transmitter into a low-density parity-check (LDPC) code word, the transmitter comprising: matrix definition logic for defining a first MxN parity check matrix, H = [H1][H2]; a triangular matrix generator for generating a second parity check matrix based on the first parity check matrix; the second parity check matrix having an MxM triangular sub-matrix by replacing [H1] with a triangular matrix; and, an encoder for mapping the data into an LDPC code word based on the second parity check matrix.

14. (currently amended) A data storage system for storing data received from an information source in a data storage channel, the data being encoded by the system into a low-density parity-check (LDPC) code word, the system comprising: matrix definition logic for defining a first MxN

**Serial No. 09/902,859**  
**Art Unit No. 2133**

parity check matrix,  $H = [H1][H2]$ ; a triangular matrix generator for generating a second parity check matrix based on the first parity check matrix; the second parity check matrix having an  $M \times M$  triangular sub-matrix by replacing  $[H1]$  with a triangular matrix; and, an encoder for mapping the data into an LDPC code word based on the second parity check matrix.

15. (new) A method for low-density parity-check (LDPC) encoding of data, the method comprising the steps of:

defining a matrix  $H$ ;

generating a matrix  $H^s$  by cyclically shifting the rows of matrix  $H$  until the leftmost subblock of  $H^s$  contains the identity matrix  $I$  along its diagonal;

triangularizing  $H^s$  by replacing with zeroes all elements below the identity matrix  $I$  along the diagonal; and

mapping the data into an LDPC code word based on the triangularized  $H^s$ .

16. (new) Apparatus for low-density parity-check (LDPC) encoding of data comprising:

a matrix definition component for defining a matrix  $H$ ;

a matrix generating component for generating a matrix  $H^s$  by cyclically shifting the rows of matrix  $H$  until the leftmost subblock of  $H^s$  contains the identity matrix  $I$  along its diagonal and for triangularizing  $H^s$  by replacing with

**Serial No. 09/902,859**  
**Art Unit No. 2133**

zeroes all elements below the identity matrix I along the diagonal; and

an encoder for mapping the data into an LDPC code word based on the triangularized  $H^s$ .

17. (new) A computer program product for low-density parity-check (LDPC) encoding of data, the computer program product comprising a machine readable storage medium storing computer program code which, when loaded in a programmable data processor, configures the processor to perform low-density parity-check (LDPC) encoding of data, the method comprising the steps of:

defining a matrix H;

generating a matrix  $H^s$  by cyclically shifting the rows of matrix H until the leftmost subblock of  $H^s$  contains the identity matrix I along its diagonal;

triangularizing  $H^s$  by replacing with zeroes all elements below the identity matrix I along the diagonal; and

mapping the data into an LDPC code word based on the triangularized  $H^s$ .